

A period of warm weather set in over California, Nevada, and the north Pacific coast States on the 5th and continued until the 8th, with maximum temperatures above 100° in the central valleys of California on the 6th, 7th, and 8th, and maximum temperatures ranging from 95° to 97° in western Oregon and western Washington on the 7th and 8th.

Frost was reported in the western parts of North Dakota and South Dakota on the 10th, in parts of Minnesota, South Dakota, Nebraska, western Kansas, and northern Iowa on the 11th, and in Michigan and parts of Wisconsin and Iowa on the 12th.

In the south of England the middle part of the month was wet and unseasonably cold, while in the north of England the country was suffering from drought.

On the North Atlantic Ocean and on the coasts and Great Lakes of the United States the storms of the month were not severe.

#### BOSTON FORECAST DISTRICT.

The month was characterized by much cloudiness, uniformly low temperature, excessive rainfall, and an unusual prevalence of easterly winds and fog. Storm warnings were displayed on the 12th, 13th, 15th, 16th, 20th, 22d, and 23d. No storms or dangerous winds occurred for which warnings were not issued.—*J. W. Smith, District Forecaster.*

#### NEW ORLEANS FORECAST DISTRICT.

The month was unseasonably cool, and at New Orleans it was the coolest June on record. No severe storms occurred on the west Gulf coast. To supply demands for information regarding the effect, in the lower Mississippi Valley, of the high water in the upper Mississippi and lower Missouri rivers during the early part of the month, the following statement was issued on the 11th:

The Mississippi, below Vicksburg, and the Atchafalaya, will rise slowly for three weeks and possibly longer, and the danger line, 16 feet, will probably be reached at New Orleans within ten days or two weeks.

The river rose slowly from 13.6 feet on June 11 to 15.4 feet on July 2, 1903.—*I. W. Cline, District Forecaster.*

#### CHICAGO FORECAST DISTRICT.

There was no storm of consequence on the upper Lakes during the month, and no warnings were issued.

Unusually cool weather prevailed over the districts until near the end of the month.—*H. J. Cox, Professor of Meteorology.*

#### DENVER FORECAST DISTRICT.

The feature of the month was the copious precipitation that occurred on the southeastern watersheds during the first two weeks.

High stages were reached in the Arkansas River, principally as a result of the heavy rainfall on the drainage areas of its southern tributaries, while in the case of the Rio Grande the usually high stages were due to the melting of snow on its upper watersheds in Colorado, in conjunction with continued rainfall in northern New Mexico, which was forecast from day to day during the period.—*J. H. Brandenburg, District Forecaster.*

#### SAN FRANCISCO FORECAST DISTRICT.

On the 3d the temperature began to rise in northern California and on the 4th in Nevada; developing into a warm wave

on the 5th, which continued over Nevada until the 8th and northern California until the 9th. Temperatures exceeding 100° were general in the great valleys of California on the 6th, 7th, and 8th. On the coast exceptionally high temperatures for the season occurred on the 6th.—*G. H. Willson, Local Forecaster, temporarily in charge.*

#### PORTLAND, OREG., FORECAST DISTRICT.

During the afternoon of June 14 a severe thunderstorm, with heavy rain and hail, occurred near the foot of the Blue Mountains in the southern part of Morrow County, Oregon. Owing to the nonabsorbant condition of the soil and the steepness of the catchment area, this rain quickly collected in the canyon near the head of Willow Creek and formed a flood which swept down the valley and wrought great destruction. The town of Heppner, near the starting point of the rushing waters, suffered the loss of nearly 200 of its inhabitants and, as near as can be estimated, property damaged to the extent of \$250,000. At the beginning the flood crest was coincident with the first appearance of the flood, but as the water advanced and spread over a large area the crest lagged several hours behind the beginning of the rise. The annual rise in the Columbia River made its appearance later than usual, and the danger line at Portland was not reached until the evening of the 3d. Daily forecasts of expected heights in the river were issued during the month for periods of a week in advance; they proved to be very accurate, and in the precautions that were taken rendered the damage to property by flood very light.—*E. A. Beals, District Forecaster.*

#### AREAS OF HIGH AND LOW PRESSURE.

*Movements of centers of areas of high and low pressure.*

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	3, p.m.	41	124	5, a.m.	47	117	1,025	1.5	683	28.4
II.....	8, a.m.	54	114	14, a.m.	35	90	2,450	6.0	408	17.0
III.....	15, a.m.	53	108	19, a.m.	47	65	3,000	4.0	750	31.2
IV.....	19, p.m.	41	124	22, a.m.	42	101	1,700	2.5	680	28.3
Sums.....							8,175	14.0	2,521	104.9
Mean of 4 paths.....							2,044		630	26.2
Mean of 14.0 days.....									584	24.3
<b>Low areas.</b>										
I.....	1, a.m.	40	122	2, p.m.	41	112	775	1.5	517	21.5
II.....	6, p.m.	50	97	9, p.m.	46	78	1,000	3.0	333	13.9
III.....	8, p.m.	32	91	16, a.m.	32	65	3,250	7.5	433	18.0
IV.....	12, p.m.	41	117	16, p.m.	45	80	2,225	4.0	556	23.2
V.....	16, p.m.	51	120	21, p.m.	42	70	3,000	5.0	600	25.0
VI.....	21, p.m.	47	92	23, a.m.	46	78	1,400	1.5	933	38.9
VII.....	21, p.m.	32	100	24, a.m.	39	78	2,200	2.5	880	36.7
VIII.....	24, p.m.	32	100	26, p.m.	36	87	2,875	2.0	438	18.3
IX.....	24, p.m.	51	120	28, p.m.	49	86	2,500	4.0	625	26.0
Sums.....							17,225	31.0	5,315	221.5
Mean of 9 paths.....							1,914		591	24.6
Mean of 31.0 days.....									556	23.2

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

#### RIVERS AND FLOODS.

The mean stages of the Missouri and Mississippi rivers were above those of the preceding month principally on account of the great flood in the lower Missouri and upper Mississippi

ivers that began during the last week of May. The upper Missouri was also higher but not decidedly so, the rise being the annual one due to snow water from the mountainous portion of the upper watershed.

In the flood districts the stages of the water were the highest in nearly sixty years and at some places on the Mississippi River the highest ever recorded. At Kansas City, Mo., the crest stage on June 1 and 2 was 35 feet, 2 feet below the great high-water mark on June 20, 1844. At St. Louis the maximum stage was 38 feet, 0.5 foot above the flood mark of May 19, 1858, and 3.4 feet below the extreme highest water of June 27, 1844. At Hannibal, Mo., the highest stage was 22.5 feet, 0.5 foot above the previous high-water mark of June 7, 1851. At Keokuk the crest stage of 19.5 feet was 1.5 feet below the previous record stage of June 6, 1851. The volume of the flood was sufficient to increase the stage at Cairo to within 1.5 feet of the danger line of 45 feet, while from below Cairo to Arkansas City, Ark., danger lines were slightly exceeded. As stated in the *WEATHER REVIEW* for May, 1903, the detailed description of these floods will appear at a later date.

Nothing of special interest occurred along the Ohio River or its tributaries.

Heavy showers during the night of June 6 over the middle and eastern portions of the James River watershed caused a rapid run-off on the 7th, resulting in a stage of 14.7 feet at Richmond, Va., on the morning of the 8th, 2.7 feet above the danger line. The usual warnings were issued on the 7th and notification given to prepare for a 15-foot stage: 14.7 feet was the stage actually reached. Some low corn, wheat, and meadow lands were submerged, but all portable property, principally along the steamboat wharfs and docks, was saved.

The South Carolina rivers were also high at the same time as a result of heavy showers, and warnings were issued from the 6th to 8th, inclusive. The stages of water in the main streams were not extreme except at Columbia, S. C., where the maximum stage was 27.2 feet, 12.2 feet above the danger line. The warnings were timely and no reports of damage along the main rivers have been received.

The heavy showers of the 4th and 5th in Georgia caused a rapid rise over all watersheds, necessitating warnings of a moderate freshet in the Ocmulgee River on the 5th and 6th. The warnings were of great value to live stock and lumber interests in the swamps and lowlands along the river. At Macon, Ga., where the maximum river stage was 19 feet, one foot above the danger line, dwellers in the bottoms were forced to temporarily vacate their homes. Many of the lowland farms were overflowed and the crops thereon ruined or greatly damaged. Reports received from those directly interested indicate that property to the value of not less than \$100,000 was saved by the flood warnings.

Flood waters in the upper Rio Grande also did considerable damage to the farm lands in New Mexico. A detailed report, by Mr. L. H. Murdoch, Section Director, Galveston, Tex., follows further on.

The Columbia River rise continued until the 20th, when its crest reached the Pacific Ocean. It will be remembered that in March the official in charge of the United States Weather Bureau office, Portland, Oreg., issued a bulletin in which he stated that, from the amount of snow apparently in the mountains, a stage of 24 feet of water might be expected at Portland by June 15. This stage is 9 feet above the danger line. On June 18 only 3 days after the time indicated, a stage of exactly 24 feet was recorded. The water continued at 24 feet until the 19th when the decline began. Daily bulletins and forecasts were issued, beginning about May 19, and continued until the waters had subsided. The forecasts and warnings were of great benefit to the agricultural and commercial interests, and a large number of commendatory letters relative thereto have been received.

The history of the unfortunate and disastrous casualties at Pacolet, S. C., and Heppner, Oreg., is familiar to all. A large number of lives was lost, especially at Heppner, where the swift torrent from the mountains engulfed many of the fleeing inhabitants ere they could reach places of safety. The damage to property amounted to at least \$7,000,000, of which over one-half was done along the Pacolet River from Clinton to Pacolet, S. C. The effects of these floods were also felt in a lesser degree across the whole northern tier of counties in the State of South Carolina.

These disasters were evidently the results of extreme intensifications of a class of disturbances that at times visit all localities. They can be neither anticipated nor prevented, but it would seem that these terrible experiences should serve as an effectual warning to others who are tempted by convenience of location or other minor advantages to establish communities in narrow valleys, below deep gorges, whose constricted outlets are of barely sufficient capacity to carry away any water much above the normal flow. Similar disasters are possible at any time where the local topography corresponds, and no false sense of security should be assumed from the fact that nothing unusual had happened during the past.

The highest and lowest water, mean stage, and monthly range at 160 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Mr. L. N. Jesunofsky, Local Forecaster at Charleston, S. C., submits the following report:

#### FLOODS IN SOUTH CAROLINA.

Unprecedented heavy rainfall over the extreme northwestern portion of South Carolina, on the Broad River watershed, during the afternoon and night of June 5 and early morning of June 6, produced severe floods in the small streams of that section and wrought great destruction of property and an appalling loss of life. The following excessive precipitation was reported at 8 a. m. June 6: Spartanburg, 5.04 inches; Greenville, 3.82 inches; Gaffney, 3.64 inches. The rainfall at Gaffney was almost continuous from 12:30 p. m., June 4, to 6 p. m., June 6, and amounted to 4.68 inches during that period.

The area flooded by precipitation of 3.50 to 5.00 inches during the twenty-four hours ending June 6, covered the whole of Cherokee, Spartanburg, Greenville, and the eastern half of Pickens counties, bordering on the Blue Ridge, Saluda Mountain range. Judging by the damage resulting from the run-off, fully two-thirds passed through the tributaries of the upper and central Broad, the Tiger, the Pacolet, and the Enoree rivers. The volume of water that passed through the Saluda caused but little damage at Columbia at the confluence of the Saluda, Broad, and Congaree, as compared to that produced by the abnormal flow of the Tiger, the Pacolet, and the Enoree passing through the Broad and emptying into the Congaree at Columbia.

At the 8 a. m. observation of the 6th the gage at Columbia showed a reading of 7.4 feet, which was a fall of 2.0 feet for the twenty-four hours previous. The stream began to rise rapidly at about 1 p. m. of the 6th, and by 8 a. m. of the 7th it had risen 12.0 feet to a gage height of 19.3 feet, or 4.3 above the point of danger. The water rose at the rate of 0.6 of a foot per hour between 8 a. m. and 12 noon to a height of 21.6 feet. At 6 p. m. the gage read 25.0 feet, rising at the rate 0.7 of a foot per hour; at 10 p. m., 26.0 feet, rising at the rate of 0.3 of a foot per hour. The crest of the flood waters passed Columbia at 1 a. m. of the 8th, at a maximum stage of 27.2 feet, or 12.2 feet above the danger point. There was a rapid decline late on the 8th and on the 9th, 10th, and 11th. The Congaree was at and above the danger line from 11 p. m. of the 6th to 7 a. m. of the 10th. During the 8th and 9th drift was running heavily, including parts of houses and some bales of cotton.

Although not so excessive as that recorded over the drainage section of the Broad, the area of 1.50 inches to 2.00 inches of precipitation extended beyond Cherokee County, on the upper Broad, throughout York County, and thence into Gaston, Mecklenburg, and Union counties, N. C., late on June 5 and the morning of the 6th. This run-off caused a rise of 13.0 feet at Camden, on the Wateree, during the 6th and 7th, to a gage reading of 28.3 feet at 8 a. m. of the 8th, or 4.3 feet above the line of danger. The waters receded slowly during the 9th, 10th, and 11th, when another supply fed this stream, causing it to rise 6.0 feet during

the night of the 11-12th. There was rapid recedence during the 13th and 14th. The Wateree, at Camden, reached the danger line at about 2 a. m. of the 7th, and fell below it at 7:30 a. m. of the 9th. The flood crest passed Camden at 3 a. m. of the 8th, at a stage of about 29.4 feet.

Moderately heavy rainfall, measuring from 1.00 inch to 1.25 inches over the upper drainage basin of the Great Pedee, between Cheraw, S. C., and Salisbury, N. C., produced a rise of 17.4 feet at Cheraw, on the Great Pedee, during the 7th, 8th, and 9th. The greatest height attained by this moderate freshet was 21.2 feet, or within 6.0 feet of the danger point.

The combined drainage from the Broad, Congaree, and Wateree rivers had emptied into the Santee River, and overflowing its banks, had spread over the wide expanse of low and level swamp lands for many miles into Orangeburg, Clarendon, Berkeley, and Williamsburg counties, thereby lessening the danger somewhat from additional rises of great magnitude. The Santee River, at St. Stephens, commenced to rise slowly on the 8th, an effect produced wholly by the rainfall in the immediate vicinity of the stream, and not from run-off from the Congaree or Wateree rivers. There was a rise of 0.4 of a foot per day only during the 9th, 10th, and 11th; a rapid rise of 4.7 feet during the 12th and 13th, and a slow rise of 0.8 of a foot on the 14th. Notwithstanding the large area of swamp lands covered by some 4 to 5 feet of water, for many miles on each side of the stream along the coastal lowlands, the Santee, at St. Stephens, continued to rise slowly until 1 p. m. of the 15th, when the gage registered 15.2 feet, or 3.2 feet above the danger point. The flood waters reached the line of danger, 12.0 feet, at about 2 a. m. of the 13th, and fell below it at about 4 a. m. of the 19th. The rate of fall per day was exceedingly small during the 16th and 17th, and rapid on the 18th, 19th, and 20th. The last of the large volume of reddish-yellow freshet waters entered the Atlantic about the 22d of June, or fifteen days after its run-off on the upper catchment basins, and discolored the waters of the ocean for many miles, both northward and southward, between Beaufort and Georgetown.

There were 628 telegraphic and postal flood warning messages sent out from Charleston station during June 6, 7, and 8, and forecasts were highly successful.

The region of apparent greatest precipitation in the Piedmont district of South Carolina was drained by the Pacolet, the Tiger, and the Enoree rivers, small tributaries of the Broad. The Pacolet River flows east of Spartanburg and west of Gaffney. Between these two towns the main line of the Southern Railway crosses the Pacolet, at Clifton, upon a high steel structure set on massive granite piers 45 feet in height. An idea of the extent and great force of the floods may be gained when it is stated that the bridge was erected to withstand any onslaught from the elements, but was swept down by the tremendous rush of waters as if it were only a pile of sand. There is a decided elevation between Columbia and the towns bordering on the Piedmont Gap, which makes the rate of fall, per mile, in waters of the Broad and its tributaries, unusually great. The elevation of Columbia is 351 feet above mean sea level; that of Spartanburg, 875 feet; Greenville, 989 feet; and Gaffney, 893 feet.

Fourteen miles below Clifton, from Spartanburg to Columbia, is the cluster of Pacolet cotton mills. To the west of the Pacolet River is the South Tiger River, with cotton mills distributed at intervals along its banks. East of Greers, the main line of the Southern Railway crosses the Tiger on an iron bridge which was crushed in a mass of ruins.

Untold loss of life, the complete annihilation of Clifton mill No. 3, and Pacolet mills Nos. 1 and 2, the injury done to thousands of bales of cotton and newly manufactured goods; 3500 operatives suddenly thrown out of employment; the complete loss of grist and flour mills, livery stables, post-offices, dwellings, stores, churches, and much live stock sum up the work of the floods that occurred between Clifton and Pacolet, on the Pacolet River, a rather small tributary of the Broad, from 5:30 to 6:30 a. m. on Saturday June 6, 1903. So quickly did the river rise that the country surrounding it was covered by 40 feet or more of water within almost an hour's time. Timber, cotton goods, baled domestics, sheetings, broken machinery, and floating dwellings came down from the wreckage. The debris which struck the dam above the mill property was unable to break it, and all of this came with terrific impetus against Pacolet mill No. 1 and tore it to pieces. The destruction of Pacolet mill No. 2, but a short distance downstream, followed in quick succession. The newest mill, No. 3, was saved from complete destruction by the breaking of the huge dam. The mills at Pacolet were located on the west bank of the Pacolet, below the surface of the country and directly next the river. Normally, the stream at that point scarcely reaches a height of over 6 feet, but on that day the waters rose about the dam to a height of over 50 feet. Fortunately the majority of the operatives' houses are located on the hills nearby, or the death list would have been far greater than that reported, 50.

The wreck at Clifton mills was probably the most disastrous in the course of the floods. The mill, erected in 1899, was completely wrecked and washed away. This mill was the first on the Pacolet River, where the site is lower than the surrounding country. On each side are high cliffs, and the water was said to have risen to the amazing height of 60 feet. For several hours the mill stood the damaging effect of the waters but gradually gave way, piece by piece, heavy timbers being thrown high into the air, for some time threatening the destruction of the trestle at Converse Station. Above the mill site is the remnant of the dam which furnished power for all three of the Clifton mills. On one side of the

dam there is piled up, in a confused mass, the remains of the power house; below this are the remains of mill No. 3. On the opposite side of the river can be seen a bare hillside. On this spot there were 15 cottages, occupied by mill operatives. Now there is only one wrecked house to be seen. The first great rise of the river occurred at about 5:30 a. m. Many of the operatives were preparing for their work and these were saved from horrible deaths by fleeing to the nearby hills; but many women and children were washed away and drowned before any alarm could be given.

The damage to the mills in the flooded section, according to the latest advices, is about as follows: Pacolet mills Nos. 1 and 2, on the Pacolet River, completely swept away. Clifton mills Nos. 1 and 2 partly destroyed. Clifton mill No. 3 a total loss, except pickers and cloth room; four warehouses gone; dam swept away. The Converse mill, at Glendale, is an entire loss. The Dexter mill was partly destroyed. Pacolet mill No. 3 sustained partial injury. The warehouses attached to Pacolet mills Nos. 1, 2, and 3, with approximately 3500 bales of cotton and 4500 bales of cloth, were carried before the rush of waters; much was recovered along the stream. The Whitney mill, north of Spartanburg, was badly damaged by water. White's mill, Tuckapau mill, Fairmount mill, Arkwright mill, Arlington mill, and the Courtenay mill were considerably injured by the flood waters. The Valley Falls mill, at Lolo, the Inman mill, at Inman, the Newry mill, at Seneca, and the Lockhart mill, on the Broad River, withstood the floods. Most of the mills that escaped the flood suffered more or less damage to machinery on the lower floors and to stock from flooding by water.

The dam at Pacolet was nearly washed away by a tremendous down-pour some three years ago.

The Saluda runs between the counties of Greenville and Anderson, between Greenville and Pickens, and between the large mills in the towns of Pelzer and Piedmont, which, fortunately, escaped complete flooding. The flooded area extended along the entire Piedmont section from the borders of Cherokee County to the eastern boundary of Georgia.

Seeking its way to the Savannah River was the immense volume of overflow that came from the Toxaway dam, that there forms a lake nearly 10 miles long and a mile wide. Some of this water was carried down the Keowee and Seneca rivers, inundating the Newry mill, at Pelzer, and the Norris mill, at Catechee. It destroyed the high railroad bridge over the Seneca, running between Seneca and Anderson, and caused the temporary suspension of the Anderson Water, Light, and Power Company's plant, located at Portman Shoals, 10 miles west of Anderson Court House, a small tributary of the upper Savannah, which supplies water and electricity to the town of Anderson, as well as a temporary suspension of the cotton mills at that point.

A tremendous landslide occurred at Tyron, N. C., at the foot of Saluda Mountain, on the Southern Railway tracks, between Spartanburg and Asheville, at about noon of the 12th, due to the excessive rainfalls over that locality but a few days previous. Thousands of tons of rocks and dirt plunged downward, completely filling in one of the largest railroad cuts in the mountains of western North Carolina and effectually shutting off all traffic for twelve days. The roadmaster had just succeeded in resuming operations of trains, which were blocked by the washouts in Spartanburg County the latter part of the previous week. It is stated that another crack has been noticed in the mountain, just in the rear of the cliff from which the avalanche descended.

The amount of damage done to railroad, telephone, and telegraph companies is enormous. Bridges, trestles, telegraph and telephone wires were swept away by the fury of the floods. Spartanburg was almost entirely cut off from communication during the night of the 6th, 7th, and a portion of the 8th. Traffic was blocked in all directions.

The total loss at Glendale, Clifton, Pacolet, and other points, based upon conservative estimates, obtained from the daily press and other reliable sources, is placed at \$4,500,000. The list of the dead and missing is 61; upward of eight bodies were not recovered. All crops along the Broad, Pacolet, Tiger, Enoree, Saluda, Congaree, lower Wateree, and the upper Santee were lost entirely. The rice plantations along the lower Santee withstood the floods quite well.

Mr. L. H. Murdoch, Section Director at Galveston, Tex., submits the following report:

#### JUNE FLOODS IN THE RIO GRANDE.

During the ten days ending June 14, 1903, precipitation occurred almost daily over the headwaters of the Rio Grande. The total fall was between 3 and 4 inches and this, with the usual amount of water from melting snow, produced quite a marked flood in the upper portion of the river.

At Rio Grande, N. Mex., the highest station from which records were secured, the water gradually rose from a level of 9.0 feet the first of the month to the maximum level of 13.6 feet on the 14th and 15th. The crest of this flood reached San Marcial, N. Mex., on the 18th and recorded a level of 12.7 feet, being a rise of 3.9 feet since the first of the month. The high water passed El Paso, Tex., between the 19th and 21st. The gage reading at that place was 14.1 feet, showing a rise of 5.1 feet since the early part of the month. High water reached Fort Hancock, Tex., on the 26th, and recorded the reading of 13.3 feet, or a

total rise of 5.8 feet for the flood. Below Fort Hancock the progress of the flood, which had its origin in the headwaters of the river, was marked by a flood in the lower portion which began about the same time.

From June 9 to 13 about 4 inches of rain fell over the watershed of the Rio Grande below El Paso. In the vicinity of Fort McIntosh the very heavy fall of about 8 inches occurred.

At Langtry, Tex., the river rose 6.1 feet on the 11th and 12th, reaching the stage of 9.0 feet. The crest of this flood reached Eagle Pass, Tex., on the 14th, where the total rise from the beginning of the rainfall was 11.1 feet and the gage reading 13.8 feet. The very heavy rainfall which occurred in the vicinity of Fort McIntosh masked the rise which was coming down the river from above that point, the highest stage at Fort McIntosh being reached on the 14th, as at Langtry. The high water reached Carrizo, Tex., on the 15th. The total rise from the 12th to 14th being about 14.5 feet. The flood passed Roma, Tex., on the 16th and recorded a level of 19.5 feet, or total a rise of 15.4 feet between the 12th and 16th. High water was reached at Fort Ringgold, Tex., on the

19th, the total rise amounting to about 15 feet. The river overflowed above Brownsville, Tex., on the evening of the 15th and then remained at about the same level until the 24th. The total rise was 13.0, or about half a foot higher than any level reached during the past twenty years.

Most of the damage resulting from the flood occurred in the vicinity of Berino, N. Mex., and was due to the giving away of the head gates of the San Jose irrigating ditch. Farms and buildings were flooded, causing damage to the extent of about \$15,000. Near Fort Ringgold several slight changes in the channel of the river are reported. For about thirty miles above Brownsville traffic was interfered with for a few days on account of the overflowed bottoms.

No regular flood forecasts are issued for the Rio Grande, but the appearance of a marked rise at a station is wired to all points on the river below that station by the local observer. On June 13 Mr. H. O. Rawlins, the river observer at Eagle Pass, notified all places below his station that an 8-foot rise had occurred at Eagle Pass. This information undoubtedly resulted in a considerable saving of stock and other property.

## CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during June are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

**Alabama.**—Corn and minor crops made satisfactory progress, and are generally promising. Cotton retarded by cool nights, but, while small, was improving at close of month, when squares were becoming general and some blooms were forming.—*F. P. Chaffee.*

**Arizona.**—There were quite good rains over a large part of Arizona during the latter half of the first and the first half of the second decade of June, but during the rest of the month the weather was dry. Moderate temperatures prevailed most of the month, but the latter part was very warm. As a rule crops did well during the month, having been revived by the showers and the increased flow of irrigation water. There was some damage later by dry weather. Range feed was plentiful and stock did well.—*M. E. Blystone.*

**Arkansas.**—The month was cool with less than the normal rainfall. Considerable progress was made in cleaning fields of weeds and crops were generally clean. Cotton made slow progress, but by the end of the month the plant, while small, was healthy, the stand fair and was beginning to take on forms. Corn made a slow, steady growth; at the close of the month nearly all had been laid by; it was tasseling well, and the stalk, while small, was healthy. Harvesting of wheat and oats progressed under favorable weather conditions; the yields were light. Early potatoes were harvested and good yields of excellent quality were secured. Apples will be a short crop of inferior quality.—*Edward B. Richards.*

**California.**—Conditions were generally favorable for crops, with the exception of deficient rainfall. Fires caused considerable damage to standing grain in the Sacramento Valley, and deciduous fruits in some sections were slightly injured by heat. Grain harvest commenced in nearly all sections before the 15th, and haying was progressing. Heavy crops of grain and hay were being harvested in southern California, and fair crops in other sections. Deciduous fruits, grapes, and oranges were in good condition.—*G. H. Willson.*

**Colorado.**—The small amount of sunshine on the eastern slope and the general lack of seasonable warmth were unfavorable to rapid growth, but this was largely compensated by copious and well distributed precipitation. Small grain and potatoes, as a rule, made excellent progress; corn grew slowly, owing to cool weather; beets made good advance; gardens, fruits, and cantaloupes did well. About one-half of the alfalfa crop was in stack at the close of month; ranges improved rapidly and afforded excellent pasturage; prospects were good for a fine crop of native hay.—*F. H. Brandenburg.*

**Florida.**—The month was cooler than the average, with a moderate deficiency in precipitation. Cotton made slow growth the first half of month, advancing favorably the latter half, although the staple was about two weeks late; fruiting was quite general. The corn crop is good. Cane, sweet potatoes, pineapples, citrus fruits, and minor crops doing well.—*A. J. Mitchell.*

**Georgia.**—A cool, wet month, the coolest June in twelve years, and with one exception the wettest. The night temperatures were unseasonably low, particularly on the 13th, when very light frost formed in a few northern localities. Excessive rains occurred in numerous sections, while in a few counties the rainfall was considerably deficient. The general conditions were unfavorable to agriculture. Crops made slow growth and were poorly cultivated. Cotton was generally small and sickly; blooming began much later than usual. Minor crops have promise of yielding satisfactorily.—*J. B. Marbury.*

**Idaho.**—Though no extremely high temperatures were recorded during the month many of the nights were unusually warm, and the mean tem-

perature was, with one exception, higher than that of any June in the past eleven years. Over the northern counties precipitation was ample for needs of vegetation and crops made unusually rapid growth; elsewhere water for irrigation has been abundant and irrigated crops have made satisfactory advance.—*S. M. Blandford.*

**Illinois.**—The weather conditions, particularly temperature, were unfavorable for crop advance throughout the month. It was too cool for growth, and the corn crop at the end of the month was very uneven, being about two weeks backward. The fields were clean and the crop in a good state of cultivation. Oats were short and uneven. The hay crop was promising, clover being exceptionally heavy. Great destruction to corn and wheat ensued from inundation in counties bordering on the Mississippi. It was estimated that over 500,000 acres under cultivation were ruined. The wheat crop was very much below the average.—*Wm. G. Burns.*

**Indiana.**—Excessive moisture during first decade delayed farm work, and low temperature until last three days of month retarded crop growth. Corn planting finished after the 15th, three weeks late at end of month. Wheat and clover harvest under way last half of month, clover heavy, wheat light. Oats uneven, suffering from rust, and unpromising. Prospect for potatoes fairly good. Apples promised less than average crop, and other tree fruit light to fair. Tomatoes, melons, gardens, cucumbers, and tobacco in fairly good condition.—*W. T. Blythe.*

**Iowa.**—Cool and dry weather was favorable for wheat and oats, checking tendency to rust and rank growth, but corn needed more warmth and sufficient rainfall to prevent encrusting the surface. Good progress was made, however, in planting, replanting, and cultivating corn, and warmer weather in closing decade brought the crop forward in better condition than was deemed possible at the outset. Hay harvest began early with good prospects. Apple crop better than in recent years.—*John R. Sage.*

**Kansas.**—Cool, dry month. Wheat harvest began in extreme south during second week, extending to central during fourth week. Corn improved as cultivation progressed and temperature rose. Cutting first crop of alfalfa began first week and second crop last week. Grass fine. Apples in good condition south, poor north. Potatoes good crop, doing well outside flooded district.—*T. B. Jennings.*

**Kentucky.**—The month was exceptionally cool, the temperature averaging lower than ever previously recorded for June in this section. Light frosts were reported in some localities on the 12th and 13th, causing a little damage to tender vegetation. The rainfall was about normal and fairly well distributed. The cool weather was unfavorable to corn and it made very slow growth during the month. The setting of tobacco was about completed during the first half of the month, and it started off fairly well. Oats and rye did fairly well. Irish potatoes and gardens showed good advance. The harvesting of wheat was generally completed during the last week, and a light crop was reported. The cool weather was favorable to apples and there was less complaint of dropping than usual.—*H. B. Hersey.*

**Louisiana.**—There was not sufficient rainfall during the early part of the month for agricultural interests, but general and sufficient showers occurred toward the close of the month. Unseasonably low temperatures prevailed during the greater part of the month and retarded the growth and development of vegetation. Cotton made very little progress until toward the close of the month and the crop is generally two to three weeks later than usual. Careful and systematic cultivation caused stubble and fall plant cane to hold their own, but spring plant suffered serious injury in some sections as a result of the cool, dry weather. Rice is promising. Corn made slow but healthy growth. Oat harvest was completed under favorable conditions. Truck gardens promise a good yield.—*I. M. Cline.*

**Maryland and Delaware.**—Abundant moisture favored grasses, but hindered cultivation and harvest, while low temperatures checked growth in corn. Wheat harvest progressed, giving light yields, but returns from barley and rye were fair to good; oats improved in the upper counties